METHOD FOR OBTAINING UE COUNTING RESULT, METHOD AND APPARATUS FOR SUSPENDING DATA TRANSMISSION

TECHNICAL FIELD

[0001] The present invention relates to radio communication technologies, more particularly to, a method for obtaining a UE counting result, a method and apparatus for suspending data transmission.

BACKGROUND ART

[0002] Currently, mobile communication technologies tend to provide high-rate multimedia services increasingly. FIG. **1** is a schematic diagram illustrating a Long Term Evolution (LTE) system.

[0003] In FIG. **1**, a User Equipment (UE) **101** is a terminal device for receiving data. An Evolved Universal Terrestrial Radio Access Network (E-UTRAN) **102** is a radio access network which includes an eNodeB/NodeB for providing a radio network interface for the UE. A Mobile Management Entity (MME) **103** is adapted to manage mobility contexts, session contexts and security information of the UE. A Serving Gateway (SGW) **104** is adapted to provide functions of a subscriber plane. The MME **103** and the SGW **104** may be in the same physical entity. A Packet Gateway (PGW) **105** is adapted to implement charging and legal monitoring functions. The PGW **105** and the SGW **104** may be in the same physical entity. A Policy and Charging Rules Function (PCRF) **106** is adapted to provide QoS policies and charging rules. A Service GPRS Supporting Node (SGSN) **108** is a network node device for providing routing for data transmission in a Universal Mobile Telecommunications System (UMTS). A Home Subscriber Server (HSS) **109** is a home sub-system of the UE and is adapted to protect UE information including the current location of the UE, the address of a serving node, UE security information and packet data contexts of the UE.

[0004] Group communication services are to provide a quick and effective mechanism to send same data to UEs in a group. The concept of the group communication is fully used in Land Mobile Radio (LMR) of a public security organization. One of the typical applications is a "Push to Talk (PTT)" function. When the group communication services are introduced to the LTE, the group communication service of the LTE needs to support at least the PTT voice communication which has similar performances as the PTT in the conventional group communication service. The group communication service of the SAE needs to support UEs of different states and different environments of the UEs. The LTE performs data transmission with broad bands, and thus the group communication service of the LTE needs to support data communications, such as voice communications and video communications.

[0005] In Group Call System Enabler (GCSE) of the LTE, functions of an application layer are introduced to 3GPP to support the group communication. UEs of the LTE are divided into different groups, and one UE may belong to one or multiple different GCSE groups. In the GCSE group, the UE needing to receive GCSE service data is called a receiving group member, and the UE sending the GCSE service data is called a sending group member. The group communication refers to the communication between the receiving group member and the sending group member. In addition, it is also needed to support communications between the UE and multiple groups at the same time. For example, the UE may perform communications of the voice service with one group and perform communications of the video service or other data service with another group.

[0006] In order to fully utilize air interface resources, when multiple UEs need to receive data of the same service, a broadcast and multicast mode which is called Multimedia Broadcast and Multicast Service (MBMS) may be used. Each MBMS carrier provides services in a service area of the MBMS carrier. In each cell of the service area, a specific MCCH is used to transmit MBMS signaling. BM-SC is a center for providing the MBMS, and the MBMS data is sent from the BM-SC to an MBMS-GW. The MBMS-GW, which is a logic node or another network node, is located between the BM-SC and an eNB and is used to send/broadcast the MBMS data to each eNB needing to transmit data. The MBMS-GW sends a data packet to a corresponding eNB, and the eNB sends data to the UE. Control signaling is sent from the BM-SC to the MBMS-GW, and then is sent to the EUTRAN via a MME. The MCE, which is a node of the EUTRAN, is to receive the MBMS signaling, decide to use a MBSFN transmission mode and send signaling to the corresponding eNB. FIG. **2** shows a structure of an eMBMS. The MCE may be a separate node, or located together with the eNB. The MBMS of the LTE is called eMBMS for short.

[0007] The eMBMS may be transmitted in a single carrier cell, different cells use different carriers, and the UE at the edge of the cell may receive only the MBMS of the current cell. However, if adjacent cells transmit the same MBMS service by using the same carrier and transmit the MBMS in a synchronized way, the UE at the edge of the adjacent cell may receive a superposition of powers the two signals. Therefore, a continuous area is defined in conventional technologies. In the continuous area, each eNB uses the same carrier to synchronically transmit the same MBMS signal, so as to improve quality of receiving the MBMS by the UE. The continuous area is called a Single Frequency Network (SFN) area. The SFN area includes cells corresponding to continuous geography locations, and the cells use the same radio resources to synchronically transmit a certain MBMS.

[0008] The GCSE service may be transmitted via the eMBMS carrier of the LTE. However, the conventional eMBMS technologies can not satisfy the requirements of the GCSE services. For example, the GCSE service needs to establish a data carrier within 300 ms. But in the conventional eMBMS technologies, the MCE needs to firstly transmit the signaling to all eNBs in the MBSFN, and then the eNB synchronically transmits the MBMS control information via an air interface. The time period needed for this procedure is longer than the time requirements of the GCSE service. Currently, two methods are provided to solve the problem. In one method, the eMBMS carrier is established in advance. In the other method, a point-to-point carrier is established firstly in the network, data are sent to the receiving group member via the point-to-point carrier, at the same time, the network starts to establish the eMBMS carrier. After the eMBMS carrier is established successfully, the data are sent to the receiving group member via the eMBMS carrier. During a certain time period, the data are sent via both the point-to-point carrier and the eMBMS carrier.